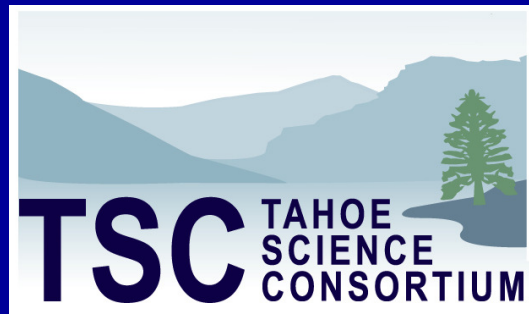


Obtaining Information in the Aftermath of a Catastrophe: Development and Implementation of the Angora Fire Monitoring Plan

Fourth Biennial California
Nonpoint Source Conference
San Diego, CA
May 5, 2008

Zach Hymanson



Lake Tahoe:

- Protection focuses on env. water quality (esp. water clarity)
- Pollutants of concern: sediment, nitrogen, phosphorous
- Urban areas considered the major source of pollution

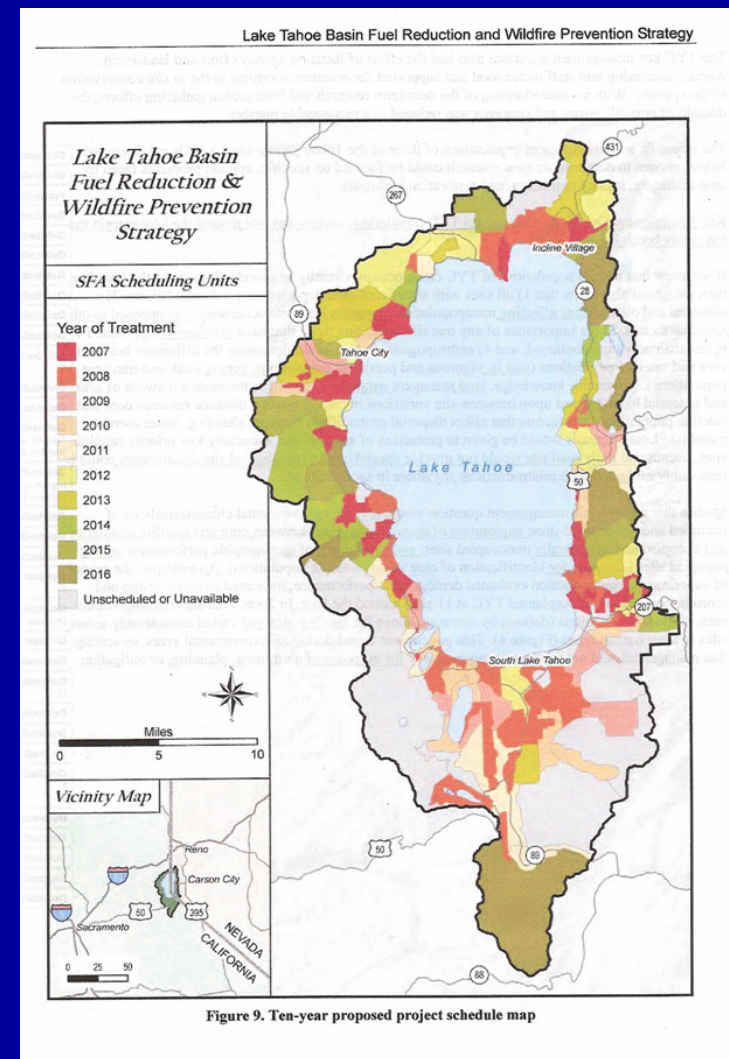
■ Wildfire effects include:

- Air pollution and deposition of pollutants
 - Alters soil composition and cover, increasing erosion
 - Destruction of riparian habitat, increased channel erosion
 - Destruction of wildlife habitat & living resources
- } Water quality degradation



Lake Tahoe Basin Fuel Reduction and Wildfire Prevention Strategy

- 14,291 acres treated between 2000-2006 by all agencies
- 68,000 acres proposed for treatment over the next 10yrs

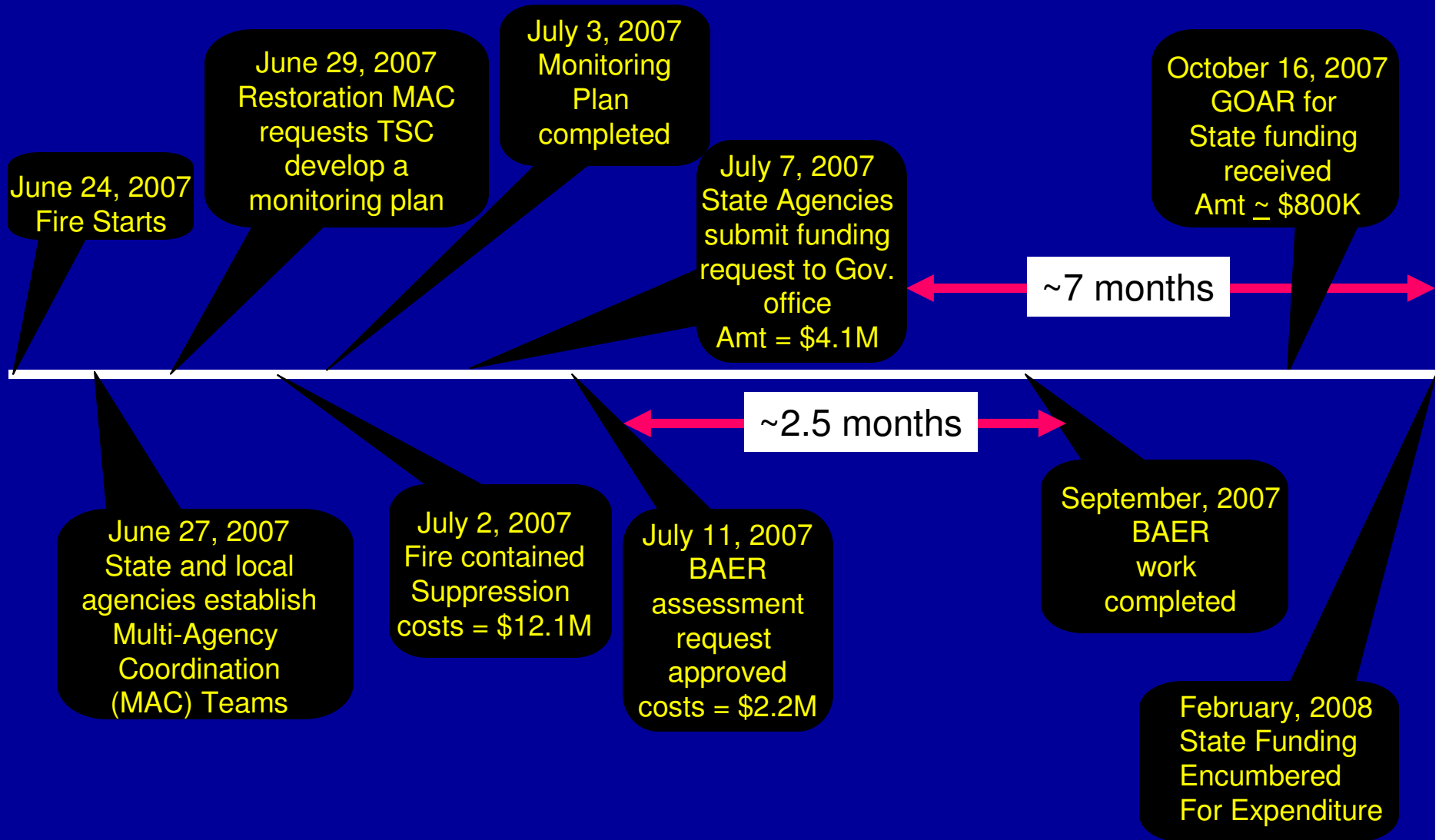


Angora Fire Stats and Location

- Nearly 3,100 acres burned in the Upper Truckee River Watershed located in the southwest portion of the Lake Tahoe Basin.
- The Fire destroyed 242 homes and 67 other structures.
- The UTR Watershed delivers ~20-25% of the total inflow to Lake Tahoe. ~ 9% of the watershed was burned

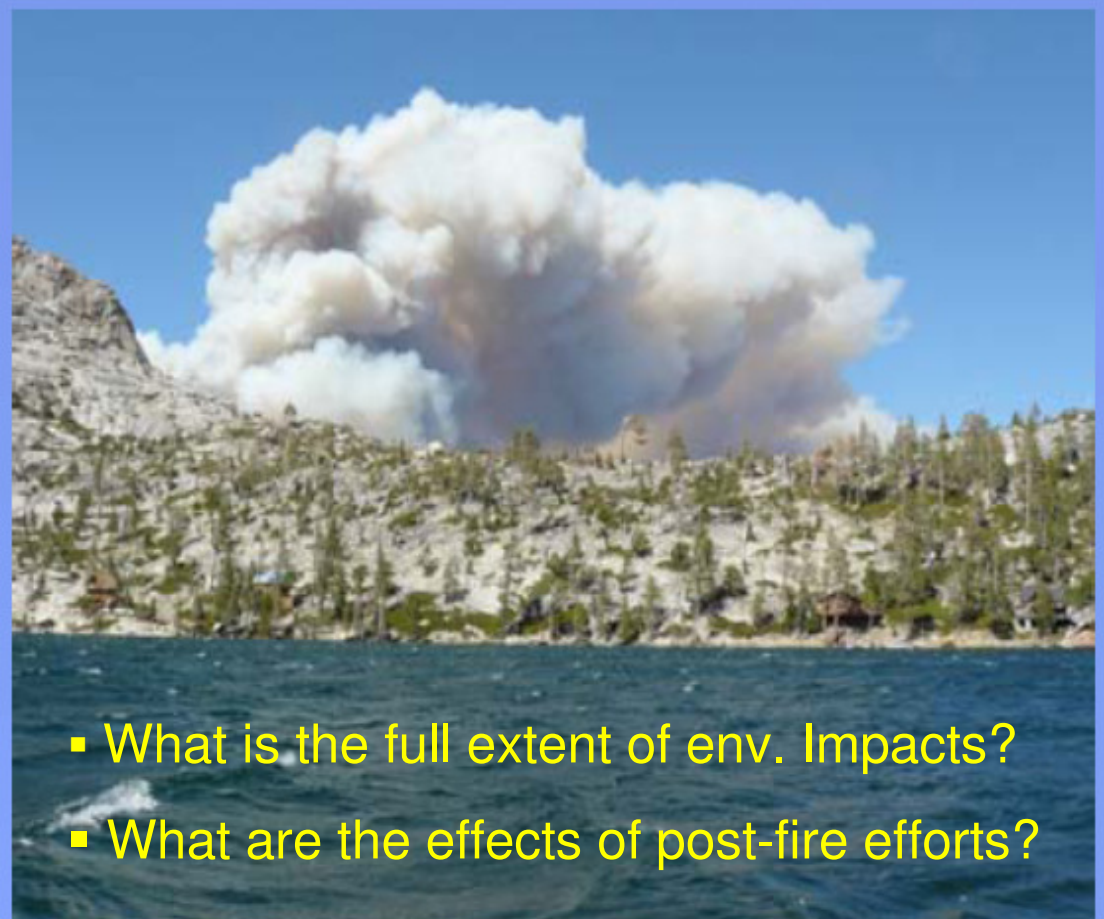


Angora Fire Timeline



Angora Burn Area Monitoring Plan: Issue Areas & Existing Resources

Topic Area	Team Leader	Existing infrastruc. & resources	Existing funding
Air Quality	Tom Cahill (UCD) & John Reuter (UCD)	Several air sampling stations and some analyses	\$8,000 (SNPLMA); \$20,000 (UCD/LTIMP)
Upland Soils	Wally Miller (UNR) & Michael Hogan (IERS)		--
Stream Geomorphology	Virginia Mahacek (V&M Consulting)		--
Water Quality	Alan Heyvaert (DRI), John Reuter (UCD), and Tim Rowe (USGS)	Sampling stations on Angora Ck. and the UTR; flow data from CSPR	\$30,000 (LTIMP funding)
Biological Resources	Peter Stine (PSW)		--
Project Manager	TBD		--
Total Costs			



- What is the full extent of env. Impacts?
- What are the effects of post-fire efforts?

Joan Florsheim - UCD Geology

*Annual costs after year one have been adjusted for inflation, assuming a 3% inflation rate.

Angora Burn Area Monitoring Plan: Issue Areas & Cost Estimates

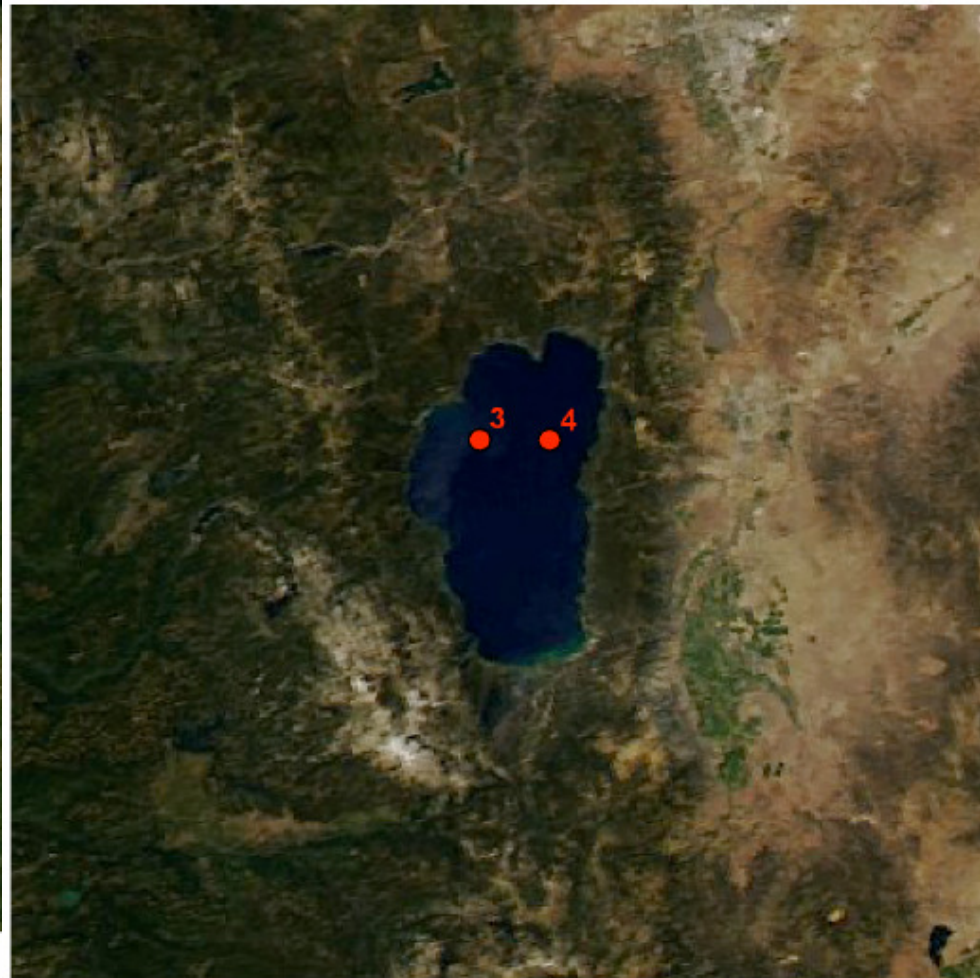
Topic Area	Team Leader	Existing infrastruc. & resources	Existing funding	One-time start-up costs	Year 1* costs	Year 2 Costs	Year 3 Costs	Year 4 Costs	Year 5 Costs	Year 6 Costs
Air Quality	Tom Cahill (UCD) & John Reuter (UCD)	Several air sampling stations and some analyses	\$8,000 (SNPLMA); \$20,000 (UCD/LTIMP)	\$8,000	\$48,172	--	--	--	--	--
Upland Soils	Wally Miller (UNR) & Michael Hogan (IERS)		--	\$13,600	631,000	\$650,000	\$670,000	\$690,000	\$710,000	\$50,000
Stream Geomorphology	Virginia Mahacek (V&M Consulting)		--	\$47,000	\$76,000	\$79,000	\$80,000 (funding for event sampling that could happen in any years)	\$80,000	\$84,000	\$30,000
Water Quality	Alan Heyvaert (DRI), John Reuter (UCD), and Tim Rowe (USGS)	Sampling stations on Angora Ck. and the UTR; flow data from CSPR	\$30,000 (LTIMP funding)	\$232,000	\$777,000	\$800,000	\$824,000	\$849,000	\$875,000	\$65,000
Biological Resources	Peter Stine (PSW)		--	\$43,000	\$392,000	\$404,000	\$416,000	\$428,000	\$441,000	\$60,000
Project Manager	TBD		--	--	\$150,000	\$155,000	\$160,000	\$165,000	\$170,000	\$175,000
Total Costs				\$343,600	\$2,074,172	\$2,088,000	\$2,150,000	\$2,213,000	\$2,281,000	\$380,000

*Annual costs after year one have been adjusted for inflation, assuming a 3% inflation rate.

What Monitoring got Funded?

Topic Area	Lead Entity	Funding Yr. 1	Funding Yr. 2	Funding Sources
Air Quality	UCD	~\$60,000		(50%)UCD (50%) NDEP
Water Quality	LRWQCB	~\$457,000	~\$179,000	(8%) LTBMU (13%) CTC/COE (79%) LRWQCB
Upland Soils	LTBMU	~\$18,500		(100%) LTBMU
Stream Geomorph.	LTBMU	~\$20,000		(100%) LTBMU
Biological Resources	LTBMU	~\$7,000		(100%) LTBMU
BAER Effectiveness	LTBMU		~\$6,000	(100%) LTBMU
Total		~\$562,500	~\$185,000	

Smoke Time Sequence Angora Wildfire



June 27, 2007, 1:40 PM

Images captured by
NASA and prepared
by Todd Steissburg
UCD-TERC

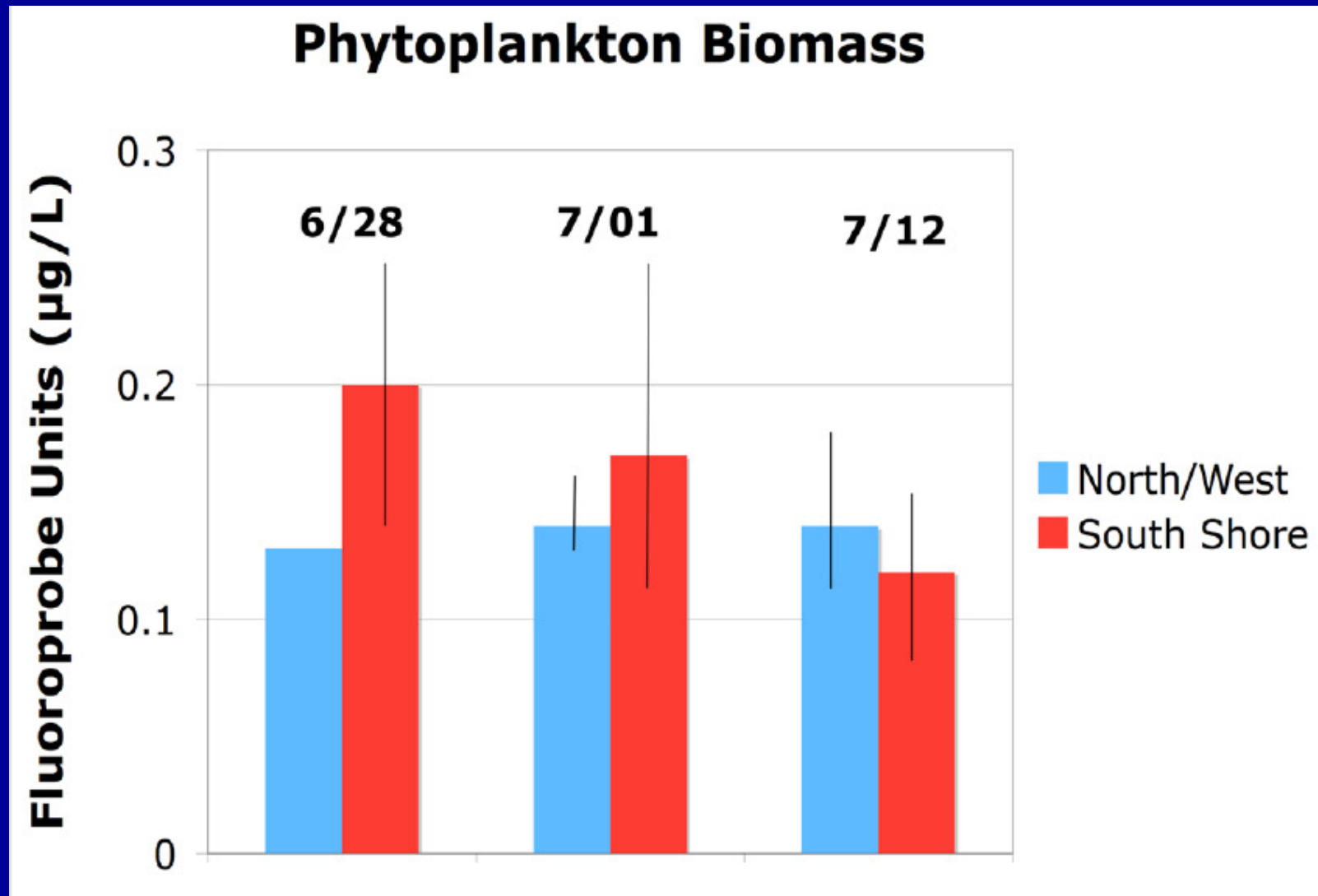
Estimated Atmospheric Deposition onto Lake Tahoe

	Total N	Total P
Load from Angora Fire (MT)	5.0 - 8.4	0.40 - 0.77
Increased Deposition During Fire	2.5 - 4 x	4 - 7 x
% of Annual Atmospheric Loading	2 - 4%	6 - 11%
% of Annual Loading - All Sources	1.2 - 2.1%	0.9 - 1.5 %

Courtesy of John Reuter (UCD-TERC)

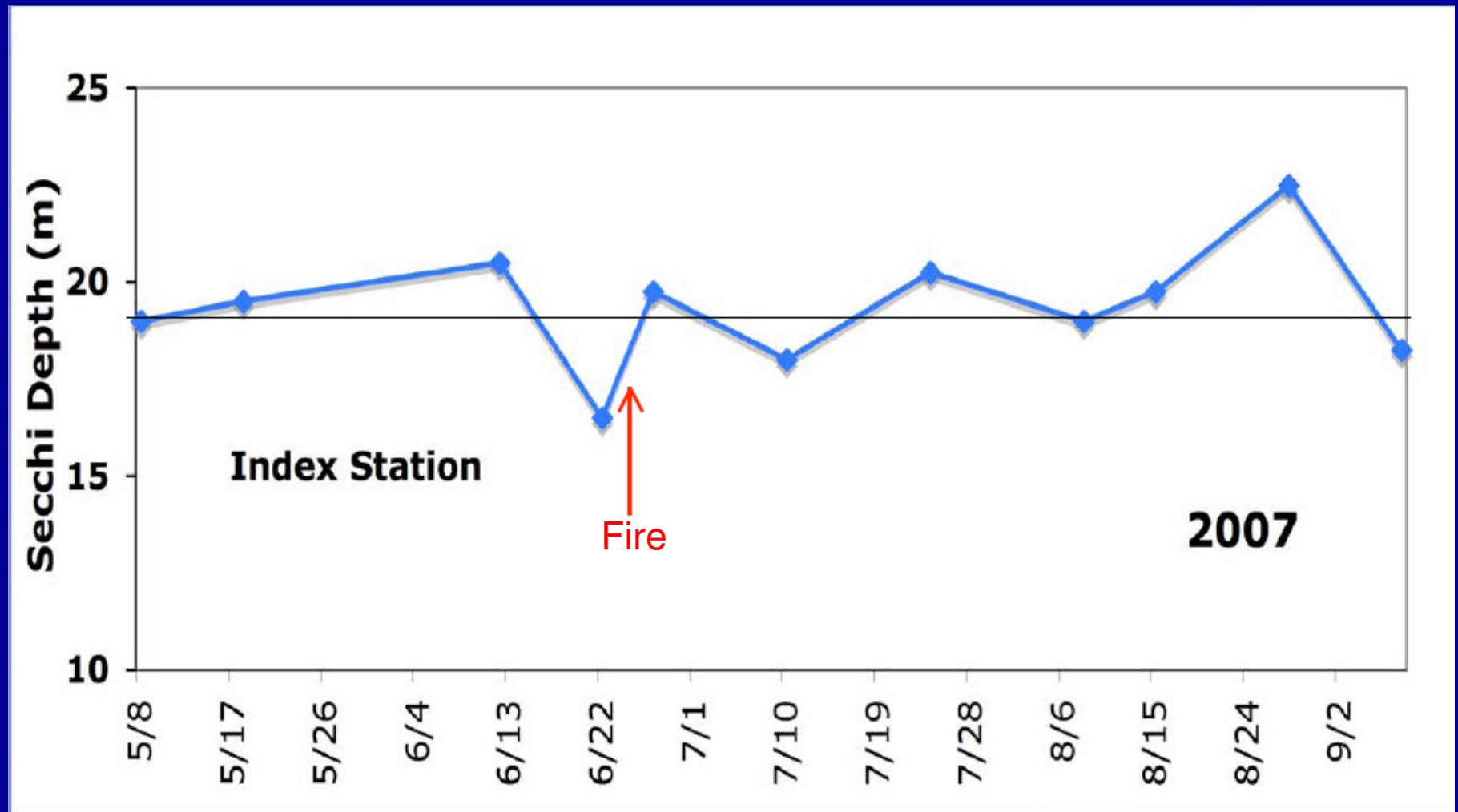
- Results are mean daily deposition, 6/25 – 6/28
- Low range from Lake buoys
- High range from So. Lake Tahoe (applies to ~25% of the Lake)

Algal Response 2-3 Weeks



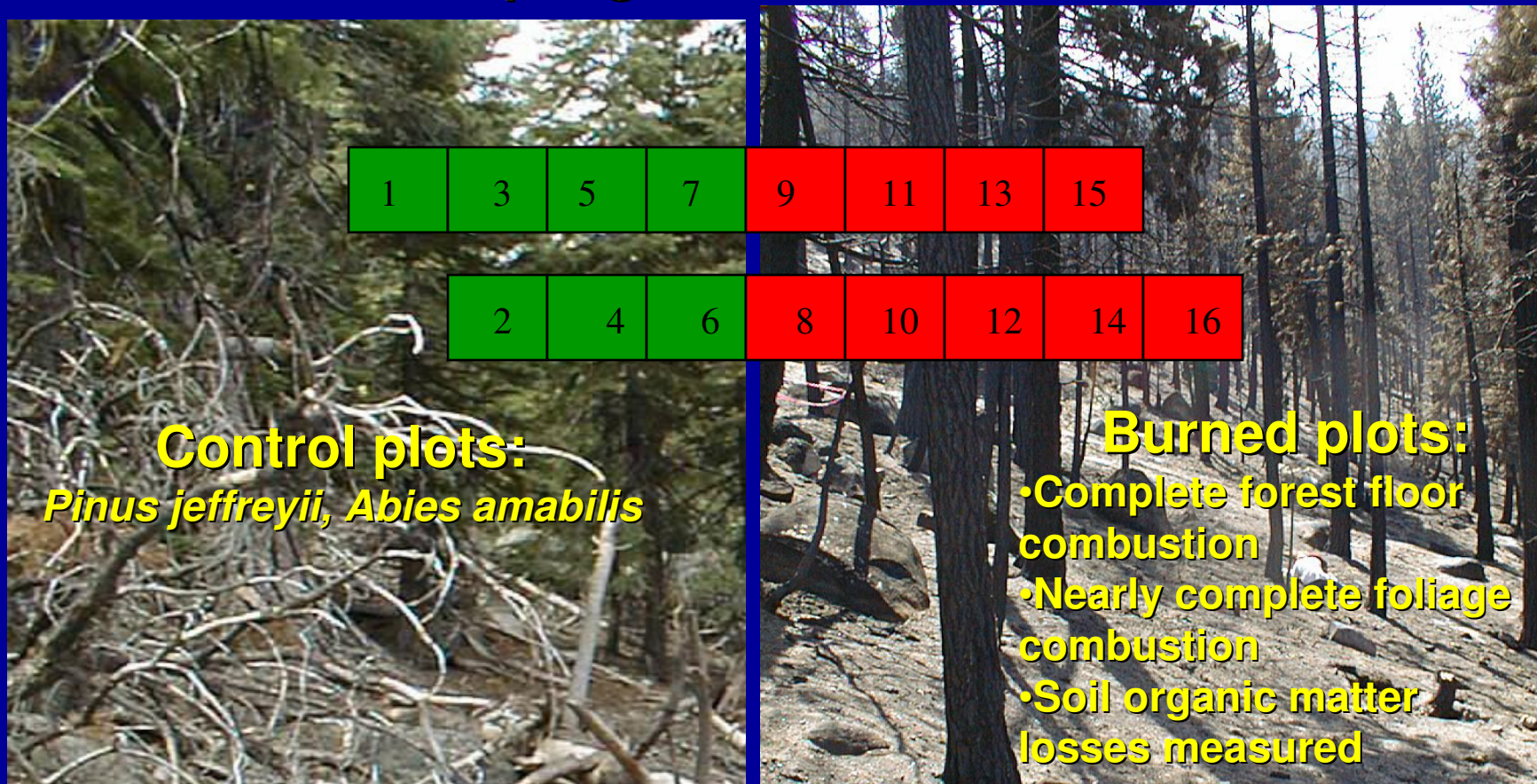
Courtesy of John Reuter (UCD-TERC)

Lake Water Clarity Response - Months



Gondola WildFire

An ~450-acre Wildfire on 3 July 2002 burned 9 of 16 previously established plots, allowing pre- and post-fire sampling with unburned controls!

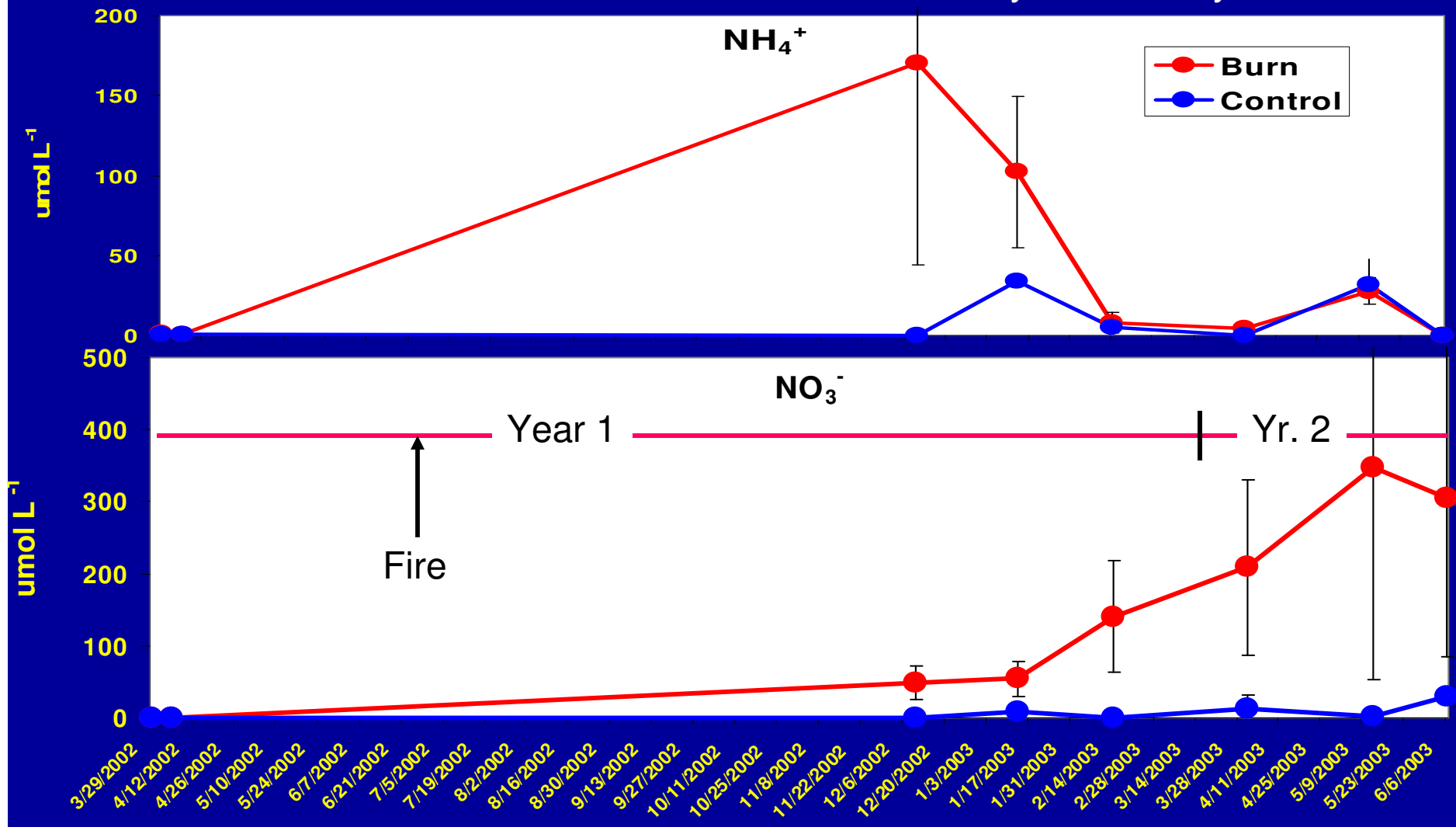


Courtesy of Dr. Wally Miller, UNR

Soil solution NH_4^+ and NO_3^- (ceramic cup lysimeters) at Gondola

- Initial increase in NH_4^+ , followed by NO_3^- , as in resin lysimeters
- Probably reflects fire-induced release of NH_4^+ followed by nitrification

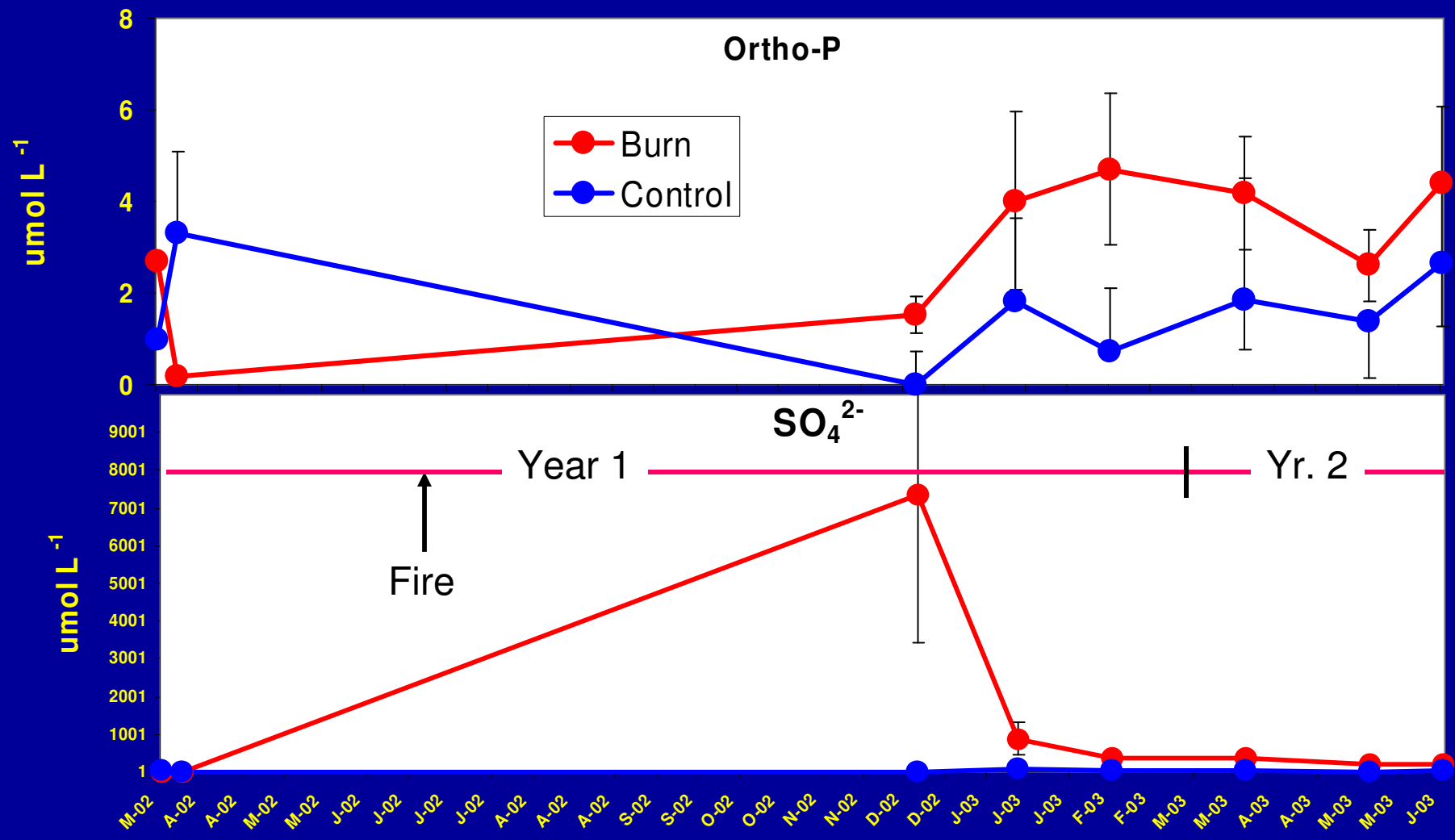
Courtesy of Dr. Wally Miller, UNR



Soil solution P and S (ceramic cup lysimeters) at Gondola

- Small increase in ortho-P leaching
- Very large increase in sulfate leaching

Courtesy of Dr. Wally Miller, UNR



Challenges

- Wildfire frequency & intensity will increase
- Interagency cooperation is limited
- State processes for rapid response funding lacking
- Pre-approved monitoring plans are lacking
- Infrastructure for rapid assessment across jurisdictional boundaries is lacking



Opportunities

- Interagency cooperation really involves 3-4 agencies
- CalEPA could lead development of rapid response fund
- Waterboards could lead development of pre-approved monitoring plans
- Interagency MOU's could deal with jurisdictional issues – probably need an incident command structure

